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Young Children and Their Perceptions of Colour: An Exploratory Study

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Disclaimer

This is to certify that all work contained in this thesis is my own unless otherwise cited. This thesis has not been previously submitted in whole or part towards a degree at this or any other university.

Signed……. Date……

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Monique Hill

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ABSTRACT

The colour scheme of the classroom is an important contributor to student achievement, as well as teachers' effectiveness and efficiency. Colour can impact more than cognitive thinking functions; it can also influence affective areas of learning. The research outlined in this paper shows that specific colours influence morale, emotions, behaviour and performance of learners, depending on the individual's age, gender, developmental level, sensitivity to colour and colour preference, the subject being studied and the activity being conducted. Colour also has a direct link to student behaviour. Because of the strong influence of colour in an education context, this study explored children's perceptions of colour and its effect on their emotions and behaviour. The major underlying colour factor that influenced behaviour, mood and learning in the classroom was colour preference. Four main areas influenced by colour preference were: a positive effect on students' interest and attitudes to learning and learning materials; the clear effect colour has on behaviour; the effect colour has on emotions; and the gender differences in colour preference.

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CHAPTER 1 INTRODUCTION

This chapter provides an introduction to the purpose for undertaking this study, as well as the rationale and locus for it. It also presents an introduction to the method used in this research.

The colour scheme of a classroom has the ability to enhance student achievement, increase teachers' effectiveness and amplify staff efficiency. If colour is used appropriately in a classroom, students' morale, emotions, behaviour and performance can be positively affected. Teachers today are faced with an increasingly diverse range of students, thus the classroom environment needs to be adjusted to enhance the learning of each student.

Aim and Purpose of the Study

The overall aim of this research project is to investigate the effect of colour in the classroom, both in the environment and written materials, as well as students' individual preferences and how this affects their emotions, attitudes and enjoyment in the classroom. This study also aims to provide teachers with insight on the importance of students' colour preferences when learning in the classroom. Further, this study also investigates colour's emotional component and makes the links between emotions and the engagement of students' learning through the use of colour. Engelbrecht (2003, p. 2) states that when colour is transmitted through the human eye, the hypothalamus releases a hormone, which directly affects moods,

energy levels and mental clarity. This study is designed to help teachers identify colour-related classroom tools that can be used to intrigue and interest students.

Research Questions:

1. Does colour preference affect students' interest and attitudes to learning and learning materials?
2. Are there any gender differences in colour preference?
3. How does colour preference influence students' emotions?
4. What effect does the influence of colour have on students' behaviour?

Rationale Justification

The rationale for this study includes:

Colour use in the classroom

As outlined in Daggett, Cobble & Gertel's (2008, p. 1) research paper, to the human eye, colour is simply 'perceived'. As the majority of humans 'perceive' colour differently, it is essential to understand that some learners are more sensitive to colours and its applications. Because learners react to colours in different ways, it is essential that teachers understand how to use colour effectively in the classroom on a daily basis. This research will outline strategies on how to use colour to its maximum potential.

Colour improving students' behaviour

Colour is important in a classroom and can cause behavioural benefits (Heppell, 2007, p. 2). Read, Sugawara and Brandt (1999, p. 417) conducted a study to test preschool students' behaviour and ability to work cooperatively through the impact of space and colour. The results of their study indicated that, by having differentiated wall colours, both behaviour and cooperative learning improved significantly.

Supporting these results, Imhof's (2004, p. 196) study found that coloured paper reduced visual stress, which in turn positively influenced behaviour patterns. However, Imhof suggested that her study needs further investigation, as she felt her research was too specific. With the ever-increasing behavioural problems in classrooms (Imhof, 2004, p. 196), it is essential this research study be undertaken now. Imhof's study demonstrated how the simple change of classroom colours can improve students' classroom behaviour.

Colour preference

Colour in the surrounding environment has a significant meaning for young children (Barrett, 2007, p. 1). Colour is seen to be the most significant element of design (Barrett, 2007, p. 1). This study attempts to show how incorporating colour preferences and the enjoyment of colour have the potential to extend students' learning, which is the teacher's primary goal. Undertaking this study is important, as it will offers teachers more avenues to achieve that primary goal.

Limitations of the study

The first limitation of the study was the number of year levels represented. Other year level teachers were asked to participate in this research study, however, declined participation. With more year levels represented, a broader range of data would be available which would allow for greater detail and more information.

It must be acknowledged that this study was undertaken with a small group of mainstream students; therefore the size of the sample of participants that took part in the research was limited.

Time was also a limitation of the study. The research project was conducted during the completion of a Bachelor of Education degree. When approval was given to research in schools, it was near holiday time, which meant that the classroom schedules were full, meaning the interview process was unable to start. This delayed the collection of data.

Conclusion

The purpose of this study was to investigate the role that colour plays, in its broadest sense, in the education of students in the classroom. In undertaking this inquiry the researcher used informal interviews, classroom observation, different coloured worksheets, a small focus group, and kept a reflective journal to describe the effect colour has on students. This research will provide teachers with a useful knowledge base for including colour effectively in the classroom.

CHAPTER 2 – LITERATURE REVIEW

Introduction

Chapter two contains a review of the literature, outlining the positive and negative effects of colour in the classroom. This chapter will consider how colour affects students; it will also discuss the effect of colour on the classroom according to student's preference. The research findings are considerable; however, the research is general and broad. Therefore, a need exists for specific research to gain a greater understanding of the effect of colour.

What is colour?

Colour has been absorbed and included in every area of our lives. In 1666, Sir Isaac Newton discovered that when pure white light is passed through a prism, it separates into visible colours. Each colour comprising a single wavelength is unable to be further separated. In the sixteenth century, colour was seen as a luxury that only the wealthy could afford (Daggett, et al., 2008, p. 1). The wealthy would purchase coloured clothing and colourful rugs to confirm their wealth and social status. Today colour is everywhere. According to Daggett et al., (2008, p. 1), colour has lost its uniqueness and its effects are often taken for granted.

Perception of colour

As outlined in Daggett, et al.,'s (2008, p. 1) research paper, to the human eye, colour is simply 'perceived'. As the majority of humans 'perceive' colour differently, it is essential to understand that some learners are more sensitive to colour and its application. Further, a small percentage of learners have a colour impairment called 'colour-blindness'. This has resulted in some students 'perceiving' colour in a way that is dissimilar from their fellows. If colour is 'perceived' in a differing way, these individuals will react differently to certain colours. As one might suspect, teachers need to take into account that colour might not affect these students in the way they had first anticipated.

The impact of colour on biological processing

Colour provokes a reaction from human beings because the energy produced by the light that carries colour, affects our bodily functions and influences our mind and emotions. A better understanding of the biological impact of colour is outlined by Engelbrecht (2003, p. 1), who states that colour does not only affect the cortex, but also the whole central nervous system. Kuller (1997), as cited in Engelbrecht's (2003, p. 1) study, has proven colour has the ability to alter the alpha level of brain wave activity, which is used by medical specialists to measure how alert a human being is at a particular time. Furthermore, Engelbrecht (2003, p. 2) states that when colour is transmitted through the human eye, the brain releases a hormone through the hypothalamus, which directly affects moods, energy levels and mental clarity.

Accompanying this view, Staynings (2008, p. 2) notes that colour is a frequency. Staynings' study postulates that as humans have twelve cranial nerves, humans must have twelve intelligences. The intelligences are broken up into the following twelve categories: observation, imagination, intuition, visual/spatial, musical/auditory, body/kinaesthetic, creativity, linguistics and interrelating. The frequency [colour] continually connects our neuro-pathways to our twelve intelligences, which then send signals to our brain without our acknowledgement. Staynings further notes that because of the moods set by various colours, some are soothing and help us focus while others are distracting. Staynings (2008, p. 2) purports that "Colour is the most powerful stimulus for the brain. It opens up areas of the brain and allows greater and easier learning and remembering to take place". Cercone Learning (2008, p. 1) has found that the brain remembers the colour first, and then the colour activates the brain. This is because colour is seen to be the most important stimulus to the brain. The human brain will first react positively or negatively to colour. This reaction will then be sent to activate the brain.

Colour and age

We all learn differently and also learn all of the time. A typical characteristic of learning is that improved learning occurs when we feel secure and comfortable, and also when we feel challenged. Human beings are wired to learn, to make connections between a wide variety of learning influences (Victorian Institute of Teaching, 2005, p. 1). The Victorian Institute of Teaching (2005, p. 1) cites research, which notes that the best use of colour selection is dependent on the age of the children. The Victorian Institute of Teaching (2005, p. 1) cited research

evidence that found that younger students learn best with the use of brighter colours, however a subdued colour scheme is needed for adolescents to learn at their optimum. Thompson (2003, p. 30) supports this view; her research has proven that young children seem to be drawn towards bright colours. In Thompson's study, students were given the opportunity to select a preferred colour. The students individually selected warm and bright colours that complemented their nature. This study found that children between the ages of five and eight rejected black, white, grey and dark brown. While bright colours are remarkably helpful at captivating attention, Thompson believes bright colours are often not conducive to learning (Thompson, 2003, p. 31).

Colour and gender

Gender is also an important factor in how students relate to colour. Depending on the gender of a student, the colour of the classroom will affect each individual differently (Victorian Institute of Teaching, 2005, p. 1). The results from the study undertaken by the Victorian Institute of Teaching are very clear. The study shows that males and females learn better in different colour environments. Males behave to a higher standard when surrounding colours are bright. However, females are well behaved when wall colours are soft and gentle. Heppell (2007, p. 2) states that sensitivity to each gender's different responses to colour is essential in creating an environment stimulating to their educational experience.

Environmental colour – wall colour

A number of studies have explored the influence of particular wall colours in relation to age and activities. Johnson & Maki (2009, p. 143) undertook a study to determine whether wall colour affected performance, learning, emotions and grades. The test group was first observed in an all-white classroom and then in a room that had been painted; the control group was observed both times in an all-white classroom. The results of this study show that wall colour in a classroom has the ability to reduce off-task behaviour and anxiety while positively affecting learning perceptions and well-being.

Wall colour and age

To increase visual perception and reduce monotony, classroom walls should incorporate a variety of colours based on age, gender, subject and activity (Daggett, et al., 2008, p. 1). Documented examples from The Victorian Institute of Teaching (2005, p. 5) state that age and gender are major contributing factors to the colour needed on walls in the classroom. This means that different coloured walls benefit different age groups. Daggett et al's. (2008, p. 1), research on the effects of wall colour needed found that younger students need light and happy colours on classroom walls, while adolescents learn more effectively with the use of gentle and deep colours. In a similar way, Engelbrecht's (2003, p. 3) research supports the idea that younger students learn in a bright environment, while cool and more subdued colours are recommended for older students.

Suitability of colour matched to activity

Daggett, et al., (2008, p. 2) found that colour has the ability to provide a supportive background for differing activities and subjects being undertaken in a school. Their study indicates that each area in a school needs a different wall colour depending on its function. An example of Daggett et al.,'s (2008, p. 2), research implies that a gymnasium is an area of high activity, which means the appropriate colours are red, orange and yellow. The environment of an art classroom should inspire, therefore the proposed colours are green, violet and light yellow.

Differing colours have the ability to affect the classroom-learning environment, as a result, colour is seen as an essential element in the classroom (Daggett, et al.,, 2008, p. 1). However, Daggett, et al., (2008, p. 1) also state that using more than six colours in a learning environment may have the ability to strain the mind's cognitive abilities. Central to this discussion, Daggett, et al., (2008, p. 1) go on to argue the colour recommendations for a classroom: green and violet are seen to be colours that inspire teamwork; red, orange and yellow provoke students to be active; turquoise, light green and light blue are colours that allow students to relax. Furthermore, Sasson's (2007, p. 1) findings state that light green is reenergising and helps students achieve a positive frame of mind during the coldest months. Daggett, et al., (2008, p. 1) have tested blue and found that blue calms the students in the classroom. Similarly Edmonton's (2006, p. 1) research has shown that blue tends to soothe students and increase productivity. Sasson (2007, p. 1) also goes on to explain that if a wall is painted the colour blue, it has the potential to calm students. This calming can be seen in the students tested who have ADD and ADHD. Additionally, Sasson (2007, p. 1) suggests that the colour blue reduces the number

of behaviour outbursts and discipline problems on a more creative level. Cottreau's (n.d., p. 1) research shows that bright colours encourage activity; she recommends that in a school, bright colours should be used in hallways, stairways and the gymnasium. Supporting the bright colours argument, Fielding (2006, p. 6) shows that learning benefits from a stimulus-rich interior and exterior environment, which is not supported with a palette that is dominated by grey, beige, white or off-white. Gruson (1982, p. 2) suggests that bubble gum pink relaxes children. Research was undertaken with aggressive children in the San Bernardino County Probation Department in California. Children were placed in a room with bubble gum pink walls. The study showed that after approximately ten minutes, the children's aggressive behaviour decreased.

Furniture colour

Often teachers have no control over the colour of their classroom walls (Smith, 2010, p. 2). However, they regularly have some control over the furniture and wall decorations used in the classroom. Smith (2010, p. 2) comments that colour should be introduced via students' desks, chairs and bookcases. Bright coloured chairs can be used in areas where students are learning high amounts of information, while softer colours should be used in areas where the teacher requires students to be relaxed and focused. At the same time, it is essential to understand that colours have the same effect on teachers as they do on students (Smith, 2010, p. 2). To enhance teacher's moods on a daily basis, specific furniture colours could be chosen.

Printed learning materials

Hartley and Rutherford (2003, p. 36) undertook research to discover if the use of coloured paper would improve response rates to surveys. The results show that while most colours did not make much of a difference, the colour pink showed significant superiority in response rates. Hartley and Rutherford's (2003, p. 37) study was unable to generate consistent results for the effects of using different colours in different contexts. However, Hartley and Rutherford (2003, p. 37) have recommended that further research be undertaken to discover if the use of coloured printed learning materials helps, at all, in classroom teaching. Their study found that when researching colour, saturation and brightness of colour are probably as important as hue. They go on to further state "these features of colour have been ignored in all of the studies here, and, indeed, in most other studies" (Hartley & Rutherford, 2003, p. 36).

Elliot (2007, p. 8) undertook research, which found that seeing the colour red before taking a test decreases the number of correct responses. In his first experiment volunteers were given a quiz with either the colour red or the colour green in the corner. In the second experiment, volunteers saw a glimpse of the colour red, green or grey on the cover of an IQ test. This study found that those who saw the colour red got fewer answers right on average. Elliot (2007, p. 8) states that "Colour is a signal, and those signals can affect our behaviour automatically without us even being aware of it". Colour is often not viewed as having the ability to change behaviour, but the research undertaken by Elliot has shown that colour does exert an influence on cognition and behaviour.

Duggan's (2009, p. v) study examined the use of coloured paper for comprehension and vocabulary assessments for the purpose of increasing test scores. Assessments were given to fifty-one fourth graders on either golderod, astrobright blue, green or white paper each week. The results of this study showed no significant differences in comprehension and vocabulary achievement scores of those who took the test on white paper and those who took the test on coloured paper (Duggan, 2009, p. 66). Duggan (2009, p. 67) suggests that individuals perceive colour differently and that optimal colour is unique. Duggan (2009, p. 67) proposes that more time, money and resources be spent determining individuals' colour preference. Once this individualised preference has been found, he suggests that the use of these specific colours, with regard to assessments, may positively affect students' individual assessment scores.

Colour, emotions and function of the classroom

While research differs greatly in its conclusions about the time of colour's impact on learning, it has been demonstrated that colour can have a significant impact on students' emotions, which will in turn lead to an influence on individuals' work and study. Maghani (2009, p. 29) has suggested that there is a direct link between the use of colour and positive and negative feelings. Maghani (2009, p. 29) outlines that over the decades, interior designers have manipulated colour to change individual's moods positively or negatively. This intentional manipulation of colour has shown that one's diposition can be changed with the painting of walls. Similarly Yu and Yoon (2010, p. 404) maintain that colour has a profound effect on visual, emotional

and mental conditions, which means colour is important in helping increase quality of life and learning (Yu & Yoon, 2010, p. 404). Yu and Yoon (2010, p. 403) also suggest there should be more research done to study the role of colour in our environment and the subsequent impact on our emotions.

Classrooms are used for a large variety of purposes, however the common denominator is active learning. Colour in the classroom must capitalise on information preservation and arouse participation since active learning is essential (Pytel, 2006, p. 1). The key to developing a learning environment is to avoid using colours that over stimulate learners. According to Pytel (2006, p. 1) each colour sends signals to our brain without our recognition. The notion that alternate signals are sent by different colours is key to understanding that each colour serves a different purpose. Therefore, wall colour should be adapted to the intended environment. Pytel (2006, p. 1) has discovered that light pink and rose are soothing colours; these colours are excellent for children with behaviour disorders or in Kindergarten classrooms where activity is generally high. As creativity is triggered by the colour green, Pytel (2006, p. 1) suggests using this colour in the art room and creative writing classrooms. Pytel (2006, p. 1) also indicates that as blue is used calming and should be used specifically for academic work; a science or math room would be the ideal candidate for blue. The research presented so far in this literature review illustrates how colour affects learning patterns, emotions, cognitive thinking and behavioural trends.

Attention span, eyestrain, work productivity and accuracy

When selecting colour combinations for a classroom, it may be beneficial to consider colour according to function rather than aesthetics alone. Kennedy (2005, 48) cites studies that show colour has the ability to 'affect students' attention span, eye strain, work productivity and accuracy'. Kennedy (2005, p. 48) also notes that colour has the ability to positively or negatively affect classroom success. As two extremes are possible, it is increasingly important to intentionally select colours used in the classroom.

To help decrease eye-strain, Cottreau (n.d, p. 1) presents the idea of painting the teaching wall a different colour or a darker hue than the other three walls, suggesting that the different hue or colour at the front of the room reduces students' eyestrain when looking up and down to write notes. Similarly, Kollie (2004, p. 36) states that painting the teaching wall [the wall at the front of the classroom, in front of which the teacher spends the most time teaching] a different colour or shade attracts attention to the front of the classroom while at the same time giving the eyes a visual break. In a classroom, students and educators need to feel stimulated and motivated. However, the balance between the discouragement of concentration and the encouragement of concentration is difficult to achieve as each student's needs may differ.

Colour and behaviour

Colour is important in a classroom and can have behavioural benefits when properly implemented (Heppell, 2007). Read, et al., (1999, p. 417) conducted a study to test preschool students' behaviour and ability to work cooperatively through the impact of space and colour. The results indicated that, by having differentiated wall colours, both behaviour and cooperative learning improved.

Similarly, research undertaken by Imhof (2004, p. 196) argued that colour simulation provided a controlling influence on children with ADHD. In Imhof's study, subjects were asked to carry out a copying task on standard white paper and on coloured paper in an unbiased order. The study found that colour stimulation has an unspecific effect on cortical activation and attention regulation. Based on the outcome with ADHD subjects, students who are not diagnosed with ADHD may benefit from added colour. Subsequently, colour may help regulate attention and extend motor timing. In Imhof's (2004, p. 196) conclusion she states that her study would need further investigation as her research focused on ADHD students. Her study showed that coloured paper reduced visual stress, which in turn positively influenced behaviour patterns.

Early research by Alexander Schauss (cited by Gruson, 1982, p. 3) stated that colour has a direct physiological impact. The electromagnetic energy of colour interacts with the pituitary and pineal glands and the hypothalamus deep in the brain. These organs have the role of regulating the endocrine system, which controls many basic bodily functions and emotional responses such as aggression. Because of this link to

emotions, Gruson (1982, p. 3) suggests that colour directly affects how students behave in the classroom. As colour has the ability to produce an emotional response, colour also has the ability to influence an individual's behaviour.

Also outlined in Gruson's article (1982, p. 3), Professor Wohlfarth conducted early seminal research in the field of colour and behaviour, which was able to drop blood pressure by seventeen per cent and also allow students to behave more attentively and less fidgety and aggressively. In the study, the walls of the classroom were changed from orange and white to royal and light blue. A gray carpet was also installed in place of an orange rug. The positive behavioural effects on the students were phenomenal. However, according to the teachers and observers, once the classroom was returned to its original design, the students became once again rowdy.

Colour and behaviour disorders

Students with attention problems appear distractible because they focus on the changing aspects of the environment. Environmental stimulus has the ability to capture individual's attention (Kercood & Grskovic, 2009, p. 231). This focus on the ever-changing environmental aspect, results in problems with sustained and selective attention (Kercood & Grskovic, 2009, p. 231). Highlighting specific words, phrases, sentences and instructions has been suggested by Kercood and Grskovic (2009, p. 231) as a useful strategy to improve students' attention in the classroom. This recommendation to highlight in the classroom has been drawn from an interpretation of the Optimal Stimulation Theory (Hebb, 1955, p. 242), which

suggests that adding stimulation in the form of bright colours has the ability to temporarily increase excitement and attention.

In the area of reading, Belfiore, Grskovic, Murphy & Zentall (1996, p. 16) undertook a study in which elementary-aged students with attention disorders were asked to read black text on white paper where some passages had the second and last thirds of text highlighted with soft and bright colours. This study found that students were able to correctly answer a larger number of comprehension questions when the coloured highlighting was present.

Similarly, Kercood & Grskovic's (2009, p. 233) undertook a study that explored the ability of students with attention problems, to complete work correctly with highlighters. Eight students were given a math worksheet with forty-nine problems. Students were asked to complete as many problems as possible in fifteen minutes. The participants were given two or three highlighters and were told to use them to colour-code the problems. The observed results show that students generally completed more maths problems correctly when they were given highlighters to use. Highlighting the work gave students the opportunity to increase focused attention on important aspects of the task, which also helped facilitate accuracy.

Lee and Zantall (2002, p. 285) also looked at the positive effect colour has on students with learning disorders. Lee and Zentall (2002, p. 285) carried out research that assessed single-digit math computation on a black and white computer screen in a high stimulation condition with problems presented on a coloured screen with a coloured background, coloured numbers and movement effects in transitions. The

results of their research show that students completed more math computation problems and answered more math computation problems correctly in the colour-stimulated environment.

Enjoyment of colour

When considering all elements of interior design, the most significant element is colour (Barrett, 2007, p. 1). Colour in the environment has a significant and profound meaning for young children. Infants are able to perceive colour differences and colour preferences at a very young age (Read & Upington, 2009, p. 491). Read & Upington (2009, p. 493) undertook a study that focused on children's colour preferences in the interior environment. Forty-five children were shown seven digital images. Each digital image was of an interior corner of a child development centre showing windows, cabinets, a table and chairs. The image was digitally manipulated to show seven different colours: purple, blue, green, yellow, orange, red and grey. Each child was shown the seven images mounted on a neutral grey board. Each child was then asked to choose the room colour that he or she would like to go to. Read & Upington's (2009, p. 495) study found that the red image was selected the most over the other images. Purple was found to be the preference for girls, 'Colour is a flexible, accessible and powerful design element' (Read, 2003, p. 238). This research study has shown that a school that chooses to incorporate colour preferences and chooses colour according to enjoyment has the potential to extend students' enjoyment of learning.

Barrett (2007, p. 1) states that all individuals are born with an inexpressible attraction for specific colours. Preference for specific colours and feelings towards them will often last throughout one's lifespan. Barrett (2007, p. 1) suggests that for humans, colour preference is the result of "your genes, early childhood memories, education, parents' beliefs, cultural training, political leanings and other aspects of living. The preference of one specific colour over another has the potential to reveal your true personality. Colour is a universal language that crosses cultural boundaries" (Barrett, 2007, p. 1).

Similarly, Carlton Wagner, the director of Wagner Institute of Color Research in Santa Barbara extends Barrett's view saying the enjoyment response to colour can be broken up into eight categories (Kopacz, 2003, p. 101): inherited, learned, geographic, regional, light, climate, income and sophisticated. Each of these eight categories look at specific ways one's enjoyment response to colour can be affected. The specific ways in which an individual's enjoyment response to colour can be affected are listed below:

- Inherited: the human endocrine system reacts to colour in a specific way because of the neurotransmitters inherited from parents.
- Learned: people and events in the past have the ability to cause a like or dislike of specific colours in the present.
- Geographic: the prominent colours surrounding geographic areas have the potential to become an individual's preferred colour/s.
- Regional: cultural attitudes towards certain colours vary and may affect individual's colour preferences.

- Light: the quality and properties of light can cause an individual to experience and view the same colour differently when the light source changes.
- Climate: each season has its own temperature range and daylight to darkness ratio; this change in temperature and daylight hours can affect how an individual reacts to certain colours.
- Income: all economic classes use colour as a status indicator. The combinations of colour will subtly reflect the class of people.
- Sophistication: as an individual matures and grows with life experiences, colour preferences change frequently according to an individual's sophistication.

Wagner's (2003) eight factors from inherited to environmental, exert a considerable influence upon the individual's preference for, and enjoyment of, certain colours. Like Wagner (Kopacz, 2003, p. 101), Coad & Coad (2008, p. 44) discovered that colour preference is difficult to establish as individuals have been impacted by life differently. Coad & Coad (2008, p. 44) undertook research to determine children's preference of thematic design and colour for their hospital environment. Interestingly the research found that there were no absolutes in colour preferences due to the varying cultures and psychological differences represented in the study.

The socialisation of young children to colour preference can be credited to genes and societal upbringing (Connor, 2007, p. 1). Connor (2007, p. 1) suggests that females find enjoyment in the colour pink because their gender role in the past was to gather food. This included the task of collecting pinkish-reddish berries. Males on

the other hand are more prone to like the colour blue because as hunters blue sky would signal good weather and represent positivity. Although these stereotyped gender roles have changed, Connor (2007, p. 1) states that females and males are still prone to gender colour preferences because society and the media have heavily promoted the idea that pink is a girl colour and blue is a boy colour. Supporting this view, Hulbert & Ling (2007, p. 624) also suggest that the sex difference colour preferences arose from the sex-specific job specialisations formed in the evolutionary division of labour. Female brains adapted to specialise in food gathering related tasks and can be supported with Hulbert & Ling's (2007. p. 625) studies of visual spatial abilities. They found the Trichromacy and the L-M channel to be modern adaptations in 'primate evolution thought to have evolved to facilitate the identification of ripe fruit or edible red leaves' (Hulbert & Ling, 2007, p. 625). Hence Hulbert & Ling (2007, p. 625) claim that the trichromatic channel adapted within the female brain, which has led to the female preference for reddish-pinkish colours.

Communication through colour

Holliday, et al., (2009, p. 259) have undertaken research, which looked into ways children with communication impairments can communicate. The research found the most effective communication method to be structured and unstructured drawing tasks. When making meaning from the drawings of children with communication impairments, the following six features "are offered as suggested aspects to consider when 'listening' to these children's messages through their drawings: facial expressions, accentuation of body features, portrayal of talking/listening, colours used, conversational partners, and sense of self" (Holliday, et al., 2009, p. 256). The

choice of colour can convey different emotions. Different colours have the ability to be interpreted to represent a variety of emotions. The study found that drawings that focus on bright colours tend to evoke a sense of positivity. However, drawings that contain dark colours evoke negativity (Holliday, et al., 2009, p. 257).

Conclusion

In the aforementioned research findings, the influence of colour in education is of high importance. Colour has been proven to have definite value when teaching in a classroom. The colour of classroom walls, furniture and worksheets as well as gender, age and function of the classroom are factors influencing the moods, enjoyment of colour and behavioural patterns of students. Colour in the classroom has the ability to both positively and negatively affect students. The research study outlined in this paper seeks to further explore the effect students' enjoyment of colour has on the classroom. This study is useful in extending understanding of the effect of students' enjoyment of colour and colour preference in the classroom, as current research on students' enjoyment of colour in the classroom is limited.

CHAPTER 3 - METHOD

This chapter describes the method employed for this investigation, incorporating the research design, the methods of data collection and the analysis of data. Ethics approval was obtained from the Human Research Ethics Committee of Avondale College.

Locus of the Study

This study considers students' reactions and emotional responses to colour in three classrooms: Kindergarten, Year One and Year Four. Two different primary schools in the Central Coast region of New South Wales, School A and School B, were involved in the research. The Kindergarten classroom was from School A while the Year One and Year Four classes were from School B.

Participants

Pilot Study – In this stage of the research project the researcher completed a two-week practicum in a kindergarten class at School A. During this time, interaction with the first group of participants occurred. This pilot study investigated the overall participants' response to colour enjoyment, preference and behaviour in the classroom. This study was carried out through intensive observation, informal interviews, a small focus group and a journal created by the researcher.

Main Research Project - For the purpose of this particular study, participants included six students randomly selected in each of the two different grade levels and at one school. The participants represented in this study were from Year One and Year Four. These grades were selected to represent a variety of ages within a primary school. The researcher questioned six students from each selected grade level. Six students in the School B, Year One classroom were questioned on colour preference, enjoyment of colour, colour and mood and colour and behaviour. This questioning was through a semi-structured interview. The same process was followed with the other class from the School B, Year Four Primary School.

Overview of Research Design

A qualitative mixed method research design was used; this included a pilot study, personal reflection journal, classroom observations, small focus groups and informal interviews with students. This study was undertaken at two primary schools, focusing on early stage one, stage one and stage two. Three groups were targeted for research to ensure the validity and reliability of research results.

Research Method

Pilot study

The first phase of this study consisted of a pilot study to determine whether or not the methods of research would be sufficient. This pilot study took place over two weeks, in a Kindergarten classroom. The researcher undertook a practicum

placement in the school for two weeks in order to work more closely with the teacher and personally trial the suggested strategies outlined below, in the pilot classroom group. During this pilot study, the researcher observed students' behaviour, reaction and preference to colour. These observations were written up in a personal reflective journal. During some of the lessons taught by the researcher, opportunities were given to allow students to choose a colour preference for a specific learning task. Semi-structured interviews also took place with six students from the classroom, three boys and three girls. From this pilot study, it was discovered that follow-up research needed to be undertaken in different stages to produce more detailed results. Upon this discovery, an emergent design was developed. This emergent design allowed for changes to be made in order to gain additional research data, which provided more information and greater detail.

Classroom observation

Classroom observation was chosen as it produced the opportunity to gather live data from real life situations. Observation allowed the researcher to view things that would normally be missed, discover things that participants might not mention in the informal interviews and observe incidents that are fresh and less predictable (Cohen, Manion & Morrison, 2001, p. 306). Semi-structured observation was undertaken as an agenda was created prior to the lessons. This approach allowed observation to occur in a structured but naturalistic way. The researcher observed how colour was used in three separate classrooms. This observation was in an early stage one classroom (Kindergarten), stage one (Year One) classroom and a stage two (Year Four) classroom. The observation in the Kindergarten classroom only took place

during the pilot study, while the observation in the Year One and Year Four classrooms took place during the main research project. During the classroom observation, the researcher examined the use of colour in the classroom to determine if colour had an effect on the students. Behaviour, mood and academic performance were all observed in each classroom. The behaviour of the students was monitored by observing the difference in behavioural patterns when coloured paper learning materials were used and when only white paper learning materials were used. Mood was observed according to the emotional reaction when coloured learning materials were used in the classroom. Quickly viewing the student's work samples indicated if the use of coloured learning materials helped with academic performance. Although the observation was for a limited period of time, results could be seen in each class.

Classroom observations were recorded as dot points on a separate sheet of paper each lesson. These observations were then collated into an observation folder.

Personal reflective journal

The researcher kept a personal reflection journal over a two-week period. During this time notes were taken down on the students' reaction to colour, colour preferences, colour and behaviour and the teacher's use of colour in the classroom. This journal was written during the pilot study to pinpoint any further research that needed to be undertaken. Writing a reflective journal allowed the researcher to gain an overall understanding of the effects of colour in the classroom. By looking at all areas that colour has the potential to impact students in the classroom environment, the

researcher was able to evaluate which area impacted the students to a greater extent.

Semi-structured interviews

Semi-structured interviews were chosen to allow the research participants to express their personal views on colour. This two-person conversation initiated by the interviewer allowed research-relevant information and data to be collected (Cohen, et at., 2001, p. 267). The advantage of the semi-structured interview is that while the interviewer is leading the process of obtaining information from the interviewee, there is sufficient freedom in the approach to permit the interviewer to probe and expand the interviewee's responses as well as to follow leads as they emerge (Hitchcock & Hughes, 1989). Semi-structured interviews have the added advantage of encouraging the participants to describe their experiences without placing any limits on, or restricting, what they might wish to express. This data was collected through the verbal interaction between the interviewer and an interviewee. Each student was individually interviewed by the researcher outside the classroom. Individual interviews were undertaken with six students in the selected early stage one classroom and stage one classroom. Interviews were specifically selected for this age group, as the students were too young to write answers or answer a survey. The interviews allowed the younger students to express their views without struggling to write. The questions were pre-determined (see Appendix A), however, the researcher asked additional questions depending on the students' responses.

Small focus groups

Focus groups permit group interaction and the discussion of particular issues with the primary goal of producing data. Focus groups also have the potential to produce insights that might not have been available in an interview. As participants interact with each other rather than with the interviewer, the views of the participants can emerge creating responses that would not be available in an interview (Cohen, et at., 2001, p. 288). Focus groups are a form of group interview, where the data collected is formed when the group interacts with each other discussing a topic supplied by the researcher. Small focus groups were selected for the participants in stage two. Students in these stages are old enough to "bounce responses off each other" (Cohen, et al., 2001, p. 288), discuss a particular topic together and express personal opinions. The focus group will provide the researcher with the opportunity to discuss each question with the group before each individual writes down his/her response. This will give the students the opportunity to listen to each other's responses before deciding for themselves the impact of colour. Focus groups are particularly useful when triangulated with traditional informal interviews, reflective journals and observation.

The students involved in the small focus group where invited to join the researcher in an adjoining, private room where some ice breaking activities commenced the session including discussion about their day. Then the researcher spent some time explaining exactly the procedure that was about to happen and their role in it, followed by the actual questions. This involved the Year Four class in School B.

Colour selection

During the focus groups and informal interviews students were asked to choose the colour they preferred the most (favourite colour) and the colour they preferred the least (least favourite colour). When asked these questions each student was given twenty colour samples to select from. These colour samples were spread out on the floor so that each colour could be clearly seen. Each student was asked to select one colour to be their favourite and one colour to be their least favourite. Once a student held the colour in their hand, their selection was recorded.

Recruitment of participants

The study was conducted in the Central Coast of New South Wales at two primary schools. The researcher held separate meetings with the two principals to request approval to conduct research in their schools. Once approval was received from School A and School B, permission was given to approach the nominated classroom teachers by phone. Once this contact had been made, the data collection was undertaken, through individual interviews and focus group with the students.

The pilot study was conducted in a Kindergarten classroom in School A. Six students were selected in total, made up of three boys and three girls. The teacher and the researcher felt it would be best for the research if the teacher selected students of varying ethnic backgrounds and academic abilities. The number of male and female participants was balanced to ensure that colour preference could be analysed according to gender, as the literature research indicated that gender was an important determinant in colour preference.

Research was then conducted in School B. Six students were selected from a Year One classroom and six students were selected from a Year Four classroom. The selected students consisted of three boys and three girls from each classroom. Once again students were selected from differing ethnic backgrounds and academic abilities. The number of male and female participants was balanced to ensure that colour preference could be analysed according to gender.

Analysis of data

Descriptive statistics are used to summarise and describe the basic features of the data found in any particular study (William, 2006, p. 1). Descriptive statistics is simply 'describing what is or what the data shows' (William, 2006, p. 1). This study analysed data through descriptive statistics as this approach presents quantitative statistics in an easily manageable form. Data can then be presented in the form of graphs, pie charts and short paragraph summaries. These methods have been carefully selected to allow the reader to understand and analyse the results easily.

Design of the interviews

As the participants were under the legal age to agree to participate independently, a parental consent form was sent home to request student's participation in the interviews. Once the parents had granted permission, the classroom teacher selected three boys and three girls from the classroom to be interviewed. This was to ensure the results could be studied according to gender preference.

The participants of the semi-structured interviews included three boys and three girls from an early stage one classroom and a stage one classroom. Six students from each year level were interviewed. Each of the interviewees was asked nine questions. The interviewee was given an appropriate amount of time to answer each question. Depending on the results, the interviewer was able to ask more questions to help understand the interviewee's specific comments. The research focus changed with the emergent design to include the effect of colour preference in the classroom. As this was the case, the research methods were changed slightly to ensure the most accurate results. The change included the writing down of verbal comments during the interviews to ensure the results were not tainted. The interviewees were reminded that they did not have to answer questions if they did not want to and they could withdraw from the interview at any time if they felt that they needed to.

Small focus groups were designed for the stage two semi-structured interviews. The participants from the stage two class [Year Four] were able to participate in a small focus group as writing at the age of nine and ten is something students are confident in doing. As responses at the age of nine and ten are more intellectual and in-depth the researcher decided the results would be more accurate if the participants were given the opportunity to individually write down their responses. The interviewer asked the three boys and three girls each question collectively. Time was provided to discuss each question as a group and discuss responses. Once the discussion had taken place the interviewees were asked to form their own response and write it down on an interview response sheet. The focus group interviewees were reminded

that they did not have to answer questions if they did not want to and they could withdraw from the interview at any time if they felt that they needed to.

CHAPTER 4 – RESULTS

This chapter provides information on the results of the data collected from the pilot study, reflective journal, semi structured interviews and focus group.

Restatement of research questions

The results will look at answering the four research questions outlined in chapter one.

- Does colour preference affect students' interest and attitudes to learning and learning materials?
- What effect does the influence of colour have on students' behaviour?
- How does colour preference influence students' emotions?
- Are there any gender differences in colour preference?

Participants in the study

All students in the study are currently attending school in New South Wales, along the east coast of Australia (as displayed in table 1.1). Six students (33.3%) are from School A [3 males, 3 females] and twelve students (66.6%) are from School B [6 males, 6 females]. Out of these students nine (50%) are male and nine (50%) are female.

Table 3.1 Student distributions across two schools

Student Distribution			
School	**Male**	**Female**	**Total**
School A	3	3	6
School B	6	6	12
Total	**9**	**9**	**18**

In relation to age, six students are in Kindergarten [3 males, 3 females], six students are in Year One [3 males, 3 females] and six students are in Year Four [3 males, 3 females] (see table 1.2). Each participant was selected by the classroom teacher to ensure a variety of students with differing ethnic backgrounds and academic abilities were represented in the research.

Table 3.2 Student stage distributions across two schools

Student stage Distribution				
	Kindergarten (Early Stage One)	**Year One (Stage One)**	**Year Four (Stage Two)**	**Total**
Males	3	3	3	9
Females	3	3	3	9
Total	**6**	**6**	**6**	**18**

Interview Questions and Focus Group Questions

For the purpose of showing accurate results the data collected has been grouped from the interview questions and the small focus group. As the questions asked were the same, it gives a more accurate indication of the results by compiling and

displaying data in one graph. This data was also grouped together as the number of students questioned in each stage level was minimal.

Preference of book selection

Figure 4.1 indicates the responses given by students on the deliberate selection of a book to read according to the colour on the front cover. Seventy-two percent of students felt that the colour of the book did impact their selection. The students who chose to read a book according to colour stated 'I pick books that have bright colours like orange, blue and red. Bright colours help me pick books'; 'my favourite books are chapter books and colourful books'; 'I like to read '39 Clues' and 'the colour of the book helps me decide because they are darker colours'. By contrast twenty-eight percent of students indicated that the colour of the book did not help when choosing a book to read. The students said 'my favourite books are chapter books and the colour of the book doesn't help me decide'; some simply stated 'no'.

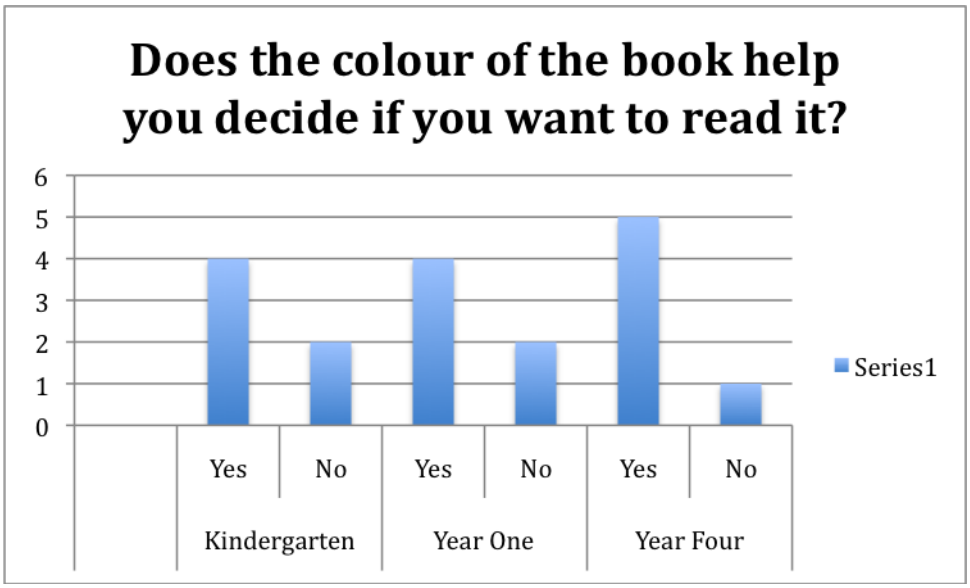

Figure 4.1 – Preference of book selection.

Noticing Colour

Figure 4.2 displays whether students noticed colour on an everyday basis. Ninety-four percent of students indicated that they did notice colour while six per cent of students indicated that they did not notice colour. When asked 'when specifically do you notice colour?' the students' responses showed variety and individuality. The students in the Kindergarten class noticed colours in the 'classroom', 'playground', 'worksheets', 'shopping centre', 'playroom' and 'at home'. The Year One students noticed colour 'when driving in cars', 'at the movies' and 'all the time looking around'. The Year Four class noticed colour on a more specific level. These students noticed specific colours on particular objects on a daily level. Such as 'yes I do notice colours. I notice colours in the bushes. There are bright red flowers and small green trees'; 'I notice the colour detail on the classroom posters, in my bedroom and the coloured sheets on the table'.

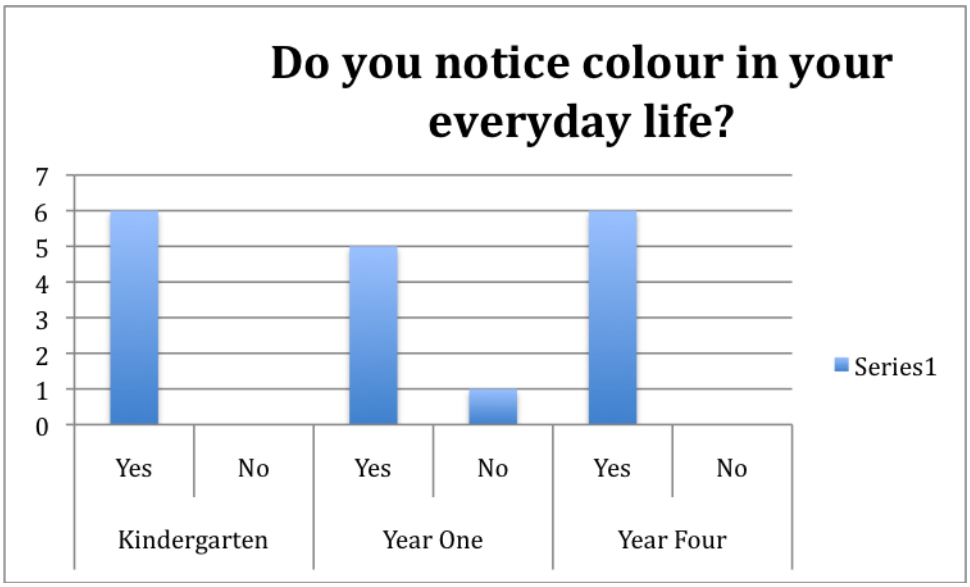

Figure 4.2 - Noticing Colour

Colour preference

Figure 4.3 displays the colour preferences of both the female and male participants in this study. Nineteen per cent of students preferred the colours pink (19%), purple (19%) and blue (19%). Sixteen per cent of the students chose the colour green to be their preference. Nine per cent chose the colour black. Six per cent chose the colours gold (6%) and red (6%) and three per cent chose the colours yellow (3%) and brown (3%).

When students selected their favourite colour a few colours were not selected by any of the students. These colours were: grey, silver, white, orange, teal, and mustard.

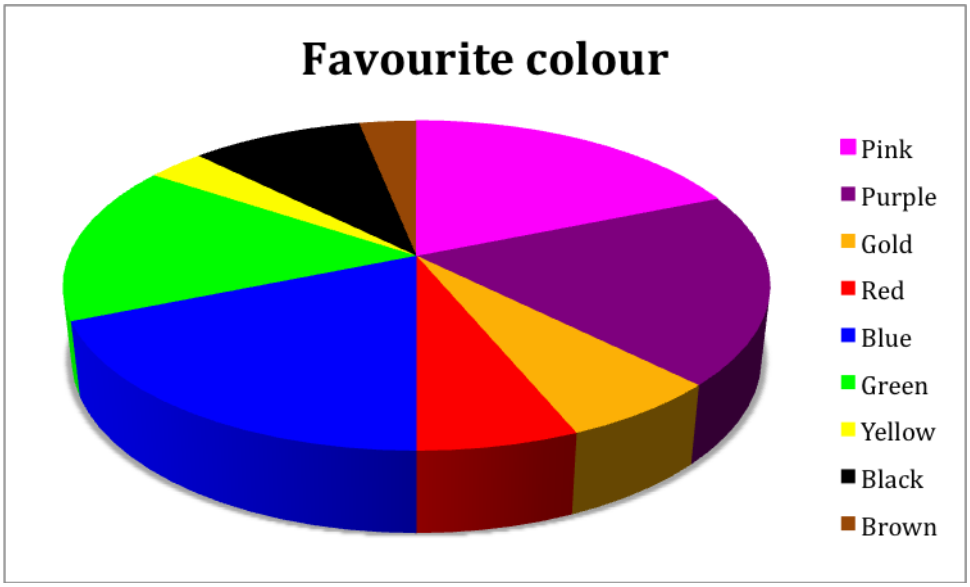

Figure 4.3 - Overall favourite colours

The students were asked to identify why they had chosen these specific colours to be their preference, the responses varied according to gender. Figure 4.4 indicates the colour preferences of males. In this table it can be seen that twenty-nine per cent of the males selected the colour blue (29%) and green (29%). Eighteen per cent of

males chose the colour black stating that they like it because ‘it is dark’. Six per cent chose the colours red (6%) because ‘it is dark’, yellow (6%) as it is a ‘bright and happy colour’, brown because ‘it is a soldier’s colour’ (6%) and purple (6%) as it ‘stands out’. The reasons for selecting these specific colour preferences were because they are ‘bright’, ‘dark’, ‘look nice’ and ‘stand out’.

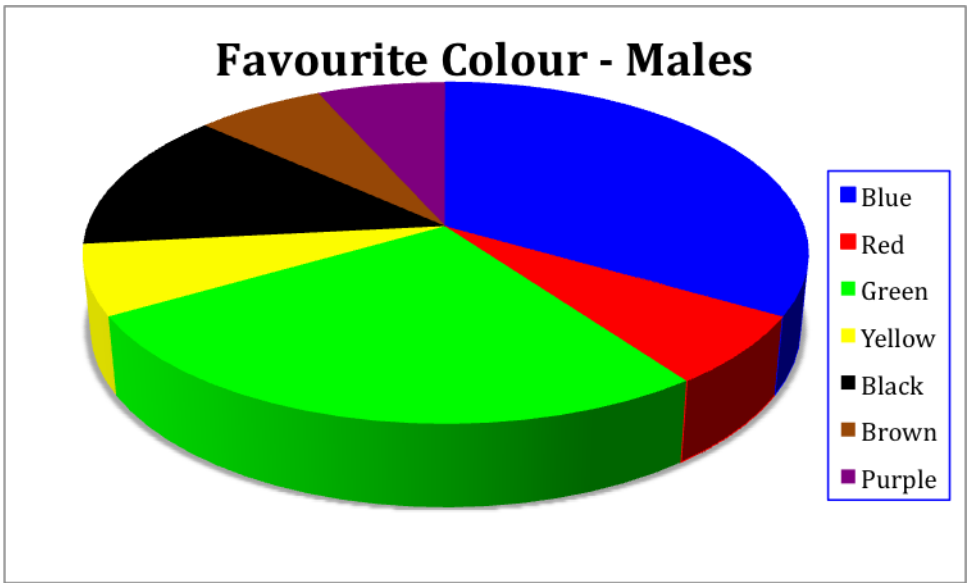

Figure 4.4 - Favourite colour - males

Figure 4.5 illustrates the colour preferences of the female participants. During the interviews, thirty-three per cent of the females chose the colour pink reasoning that ‘it is a bright colour’ and twenty-eight per cent chose the colour purple as their preference because ‘it is bright’. Eleven per cent selected the colour gold, as it is a ‘dark colour’ and six per cent chose the colour red (6%), green (6%), black (6%) and blue (6%). When asked why each individual selected a colour the females responded saying the colours are ‘bright’, ‘they stood out’, ‘the colours were pretty’ and ‘most girls like them’.

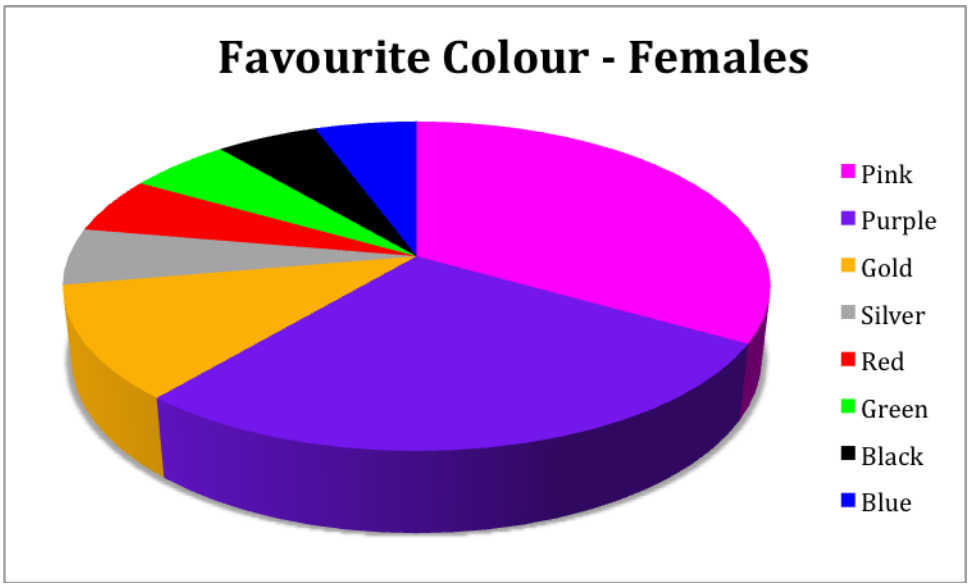

Figure 4.5 - Favourite colour - females

Figure 4.6 signifies the participants' overall least favourite colours. Twenty-two per cent of participants chose the colours black (22%), grey (22%) and pink (22%) as their least favourite and. Fourteen per cent chose the colour brown and five per cent chose the colours orange (5%), blue (5%), white (5%) and red (5%). The choice of these colour selections differed between the males and females, this can be seen by the colour selection shown in figure 4.7 and figure 4.8.

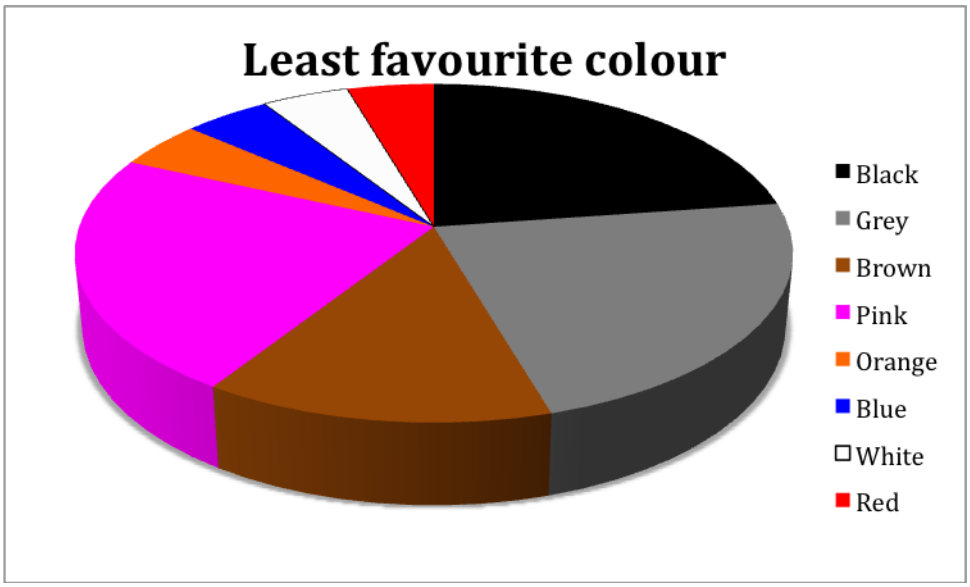

Figure 4.6 - Overall least favourite colours

The males' least favourite colours can be seen in figure 4.7. Thirty-seven per cent of the males selected the colour pink to be their least favourite. Eighteen per cent chose the colour yellow and nine per cent chose the colours orange (9%), white (9%), red (9%) black (9%) and brown (9%). The males stated that the colour pink was 'too girly' and 'boys don't like the colour pink', yellow was said to be 'weird' and 'doesn't match with anything'. The colours brown, orange, black, red and white were not liked because they are 'dull', 'not bright enough', 'yucky' and 'dirty and gross'.

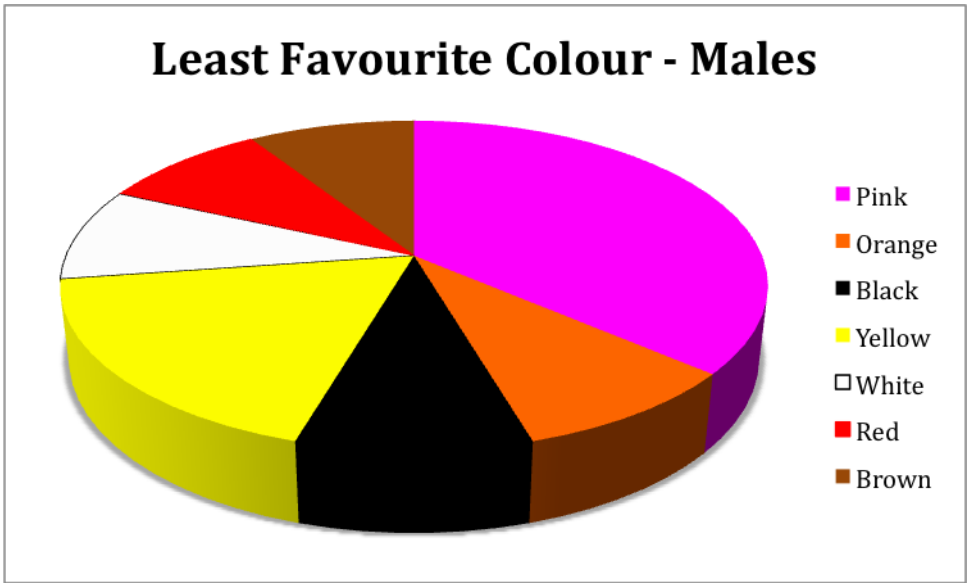

Figure 4.7 - Least favourite colour - males

Figure 4.8 demonstrates visually the female participants' least favourite colours. Thirty-one per cent of the participants indicated they like the colours brown (31%) and black (31%) the least. The colour brown was said to be 'boring' and 'not exciting', participants see the colour black as 'dull and boring', 'yucky' and it 'doesn't look pretty'. Twenty-four per cent of the females stated grey was the colour they liked the least. Grey was said to be 'plain and dull, it is like nothing', 'boring' and 'doesn't look exciting. Eight per cent indicated they liked the colours blue (7%) and green

(7%) the least. One student said the colour blue was ‘weird and yucky’, another said that green was her least favourite as it ‘is too dark and mostly a boy colour’.

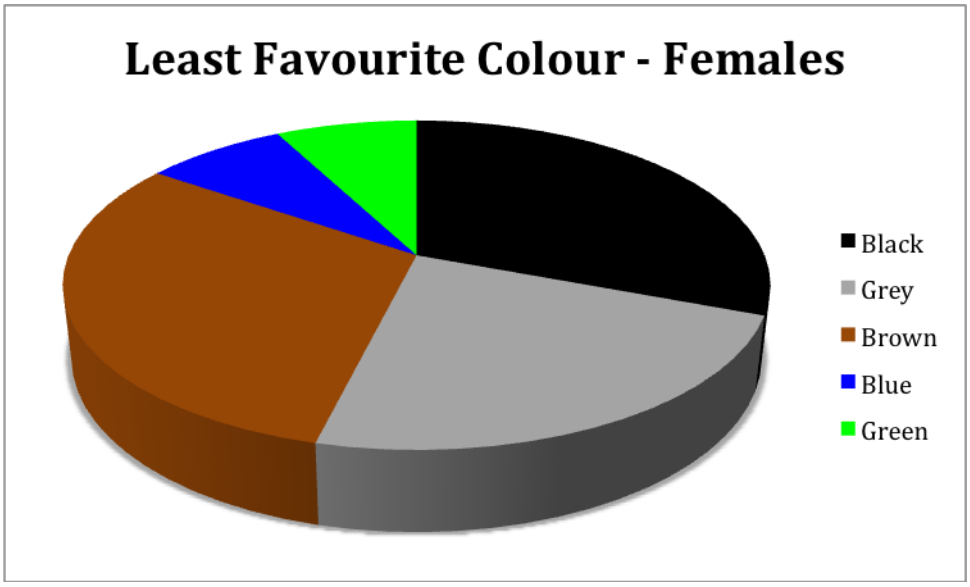

Figure 4.8 - Least favourite colour - females

Impact of colour on feelings

Each student interviewed stated that colour made him or her happy (see Figure 4.9). The responses about why colour makes them happy depended on the individual. Six students stated that bright colours made them happy; one student’s response was ‘colour makes me happy. The ones I like that make me happy are bright colours’. Three students’ responses depended on their colour preference; one boy said ‘yes – it makes me get excited, especially if it’s my favourite - green, black and blue.’ Another student looked at this question as an obvious answer saying; ‘colour makes me happy because if the world was just black and white it would be boring’.

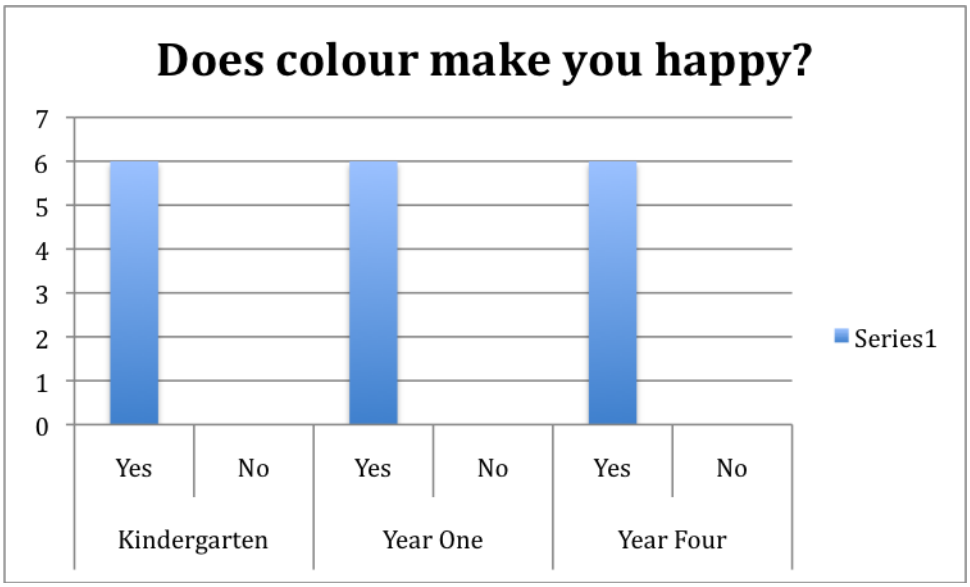

Figure 4.9 - Impact of colour on happiness

Figure 4.10 outlines the impact of colour on sadness. The students who felt that colour makes them sad stated specific colours, the colours mentioned were grey, brown and black. The most common reason for this was the fact that 'they don't look very nice, are dark and sad colours'. The students who said colour did not make them feel sad stated colour 'just doesn't make me sad because it makes me happy'.

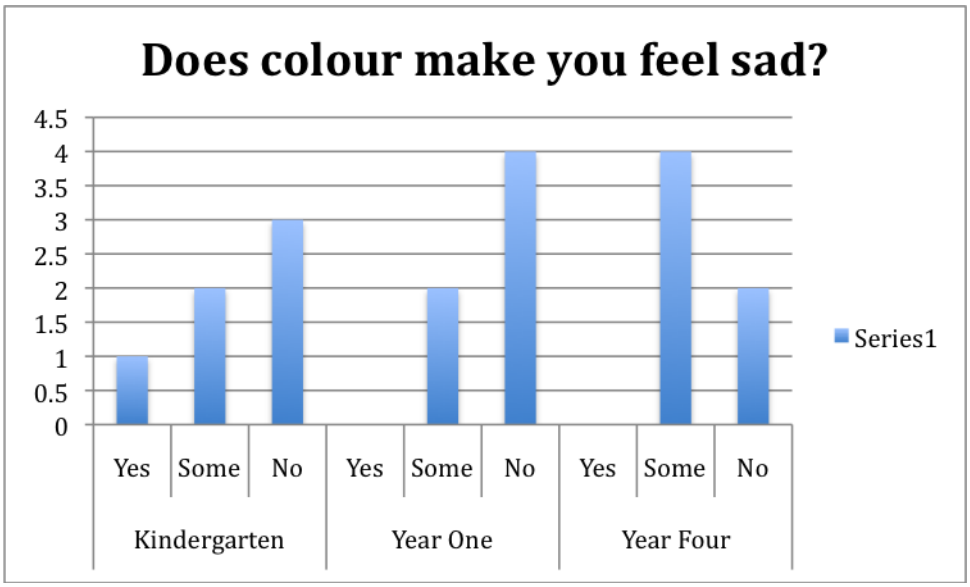

Figure 4.10 - Impact of colour on sadness

Impact of colour on behavioural changes

Figure 4.11 shows that seventy-two per cent of participants interviewed indicated that colour has the ability to change one's behaviour. Eleven per cent believed that colour only has the ability to 'sometimes' change behaviour. While seventeen per cent of the participants state that colour does not have the ability to affect behavioural changes. Those who do think colour can change behaviour suggested that 'colours you like can positively affect how you behave and colours you do not like will negatively impact your behaviour'. Participants said 'Black will make you sad and depressed. Pink and purple make you behave better, they look pretty and bright which makes you want to behave better'; 'you might not like a colour, which will make you behave badly. Make you annoyed if you don't like it'; 'If colour makes you happy, you behave happy and better'; 'pink makes me behave good because I like it'; 'I think colour does make my behaviour change because bright colours are exciting and dull colours are not'; 'bright colours make you want to work'; 'black makes me annoyed, blue makes me calm' and 'red would make me behave angry. Blue makes me sad'. Those participants who said colour did not have the ability to affect behaviour suggest that 'colours are just colours', 'colour only changes what I like' and 'colour is just a colour, you behave how you feel'.

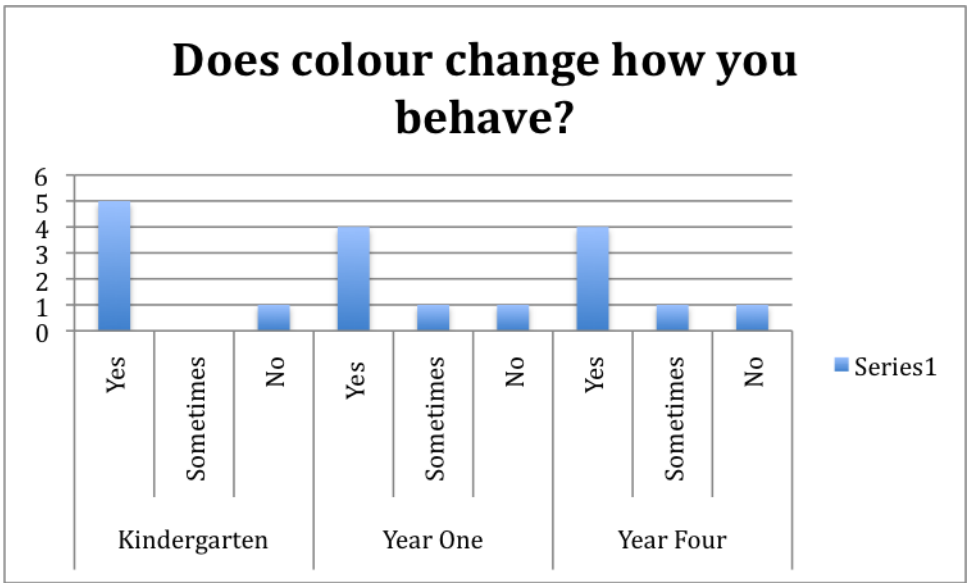

Figure 4.11 - Impact of colour on behavioural changes

Impact of colour on mood changes

Illustrated in figure 4.12 is the impact of colour on mood changes. Seventy-eight per cent of the participants' outlined that yes in fact colour can change your mood. Six per cent opposed this idea and suggested that colour has no effect on mood and eleven per cent suggested that colour has the potential to only sometimes change and affect mood. Students stated 'my green wall in my bedroom makes me creative', 'if I like it I will be happy' and 'you feel good if you like the colours'. The student who put forward the idea that colours have no impact on your mood stated that 'colours always stay the same'.

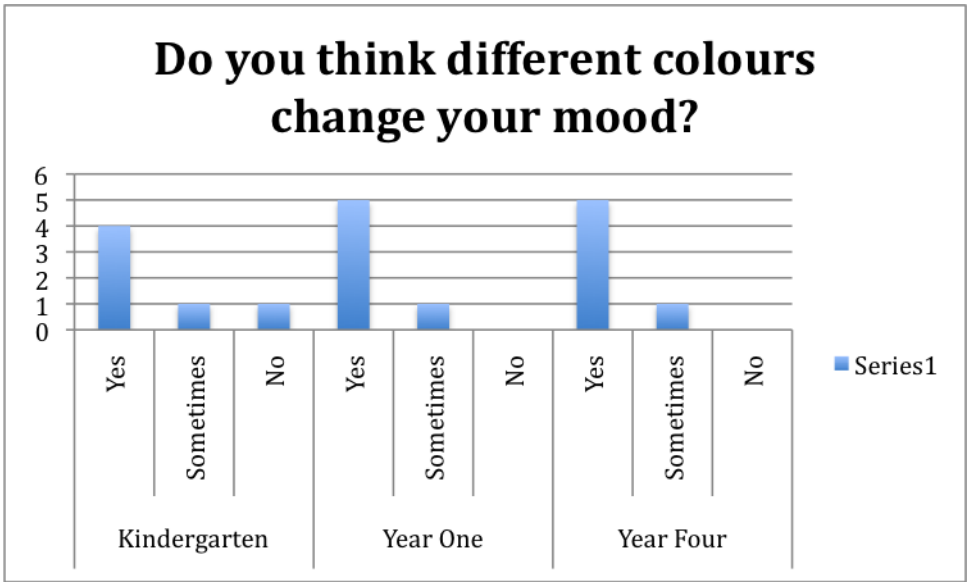

Figure 4.12 - Impact of colour on mood changes

Pilot Study – Personal reflective journal

Classroom colour

While observing the Kindergarten classroom, it became apparent that colour was able to be seen everywhere. The classroom walls were painted white; however, the classroom was decorated with a jungle theme in mind. This jungle theme caused the colour green to be displayed almost everywhere within the classroom. Contrasting the green jungle theme, the classroom carpet was a deep dark blue. The students' work samples were also placed around the classroom; these were displayed on bright blue pin boards.

Printed learning materials

While reading the researcher's personal reflective journal it became clear that printed learning materials did have an effect on students. During an English lesson the classroom teacher used yellow printed learning materials. The class seemed content and were able to concentrate on a higher level. The students also verbalised their excitement of getting the opportunity to use coloured paper. When teaching Mathematics the maths worksheets were photocopied onto coloured paper, pale pink for the girls and yellow for the boys. During this section of the Mathematics lesson, the class was quiet, paid attention and followed instructions well. In a handwriting lesson the 'See the Sun' worksheet was photocopied onto fluorescent yellow worksheets. During this lesson the students eagerly discussed the bright coloured worksheets and the excitement this sheet was bringing to the lesson.

Colour preference

Observing the students during the two-week pilot study allowed for the opportunity to reflect on students' reaction to colour and preference of particular colours. Over the two-week period the students were given the opportunity to show colour preferences. During the pilot study, students were given the choice to pick a Bible verse on either coloured paper or white paper with a picture. Each student in the class chose the Bible verse on coloured paper. In an art lesson blue paper was used as the background. One girl stated "Miss Hill, I love working with colours, it brightens up my day." During a Mathematics lesson on length, participants were given the chance to search the classroom in order to find an object that was either longer or shorter than

the object displayed at the front of the classroom, the students only selected and pointed to coloured objects. The colours that were not represented include brown, grey, white and black.

During one lesson two boys requested if they could colour in the handout as the "white page was too boring". In a show and tell lesson one boy showed the class a book, to begin his talk he stated "I like this book because it is colour(ful) and funny". On the last day of the pilot study the class were given the option of choosing a black, pink, white or blue cupcake. The students only chose the option of the pink or blue cupcake.

Behaviour

During this pilot study reflections were written according to the impact of colour on behavioural adjustments. From observation during this pilot study students appeared to be more relaxed and better behaved when sitting in the 'learning area'. This learning area was blue in colour with a bright and colourful mat that students were required to sit on. During the reading lessons a piece of coloured paper was handed to each student. Students were asked to hold the paper in their hands while a story was read to them. During this time the students were not fiddling with the paper as first anticipated. Instead the students were exceptionally well behaved. During a writing lesson students were practising tracing their name onto scrap paper. One half of the class was given coloured scrap paper, while the other half of the class was given white scrap paper. The students who were using the coloured scrap paper

were working quietly and concentrated hard on the task. The students using white scrap paper were talkative, fidgety and easily distracted.

Conclusion

As can be seen from the preceding results these young students were very aware of colour and had very definite ideas about their preferences. The semi structured interviews, the focus group and the personal reflective journal produced similar results in students' preferences, emotional effects, behaviour and enjoyment. In addition to these similarities the three different investigative approaches produced further detail and useful information.

CHAPTER 5 - DISCUSSION

The research data from this project identifies how colour affects students in the classroom. The results can be broken up into three categories; colour preference, influence of colour on students' behaviour and the influence of colour on students' emotions.

Colour preference

The current study revealed that colour preference was strongly related to gender in the group of participants. Read's (2003, p. 238) research found that purple and pink were the colour preferences for girls and blue for boys. This research study similarly found that the majority of the females selected chose the colours purple and pink to be their preference. It was also found that the male participants chose the colours blue and green to be their preferred colours. Looking at the results of the participants it can be clearly seen that colour preferences are specifically selected according to gender. Connor (2007, p. 1) suggests the idea that the colour preferences of both males and females can be credited to genes and societal upbringing. He suggests that females like the colour pink because their role in the past was a food gatherer, which included collecting pinkish-reddish berries. Males on the other hand are more prone to like the colour blue because as hunters blue sky would signal good weather and represent positivity. As time has moved forward Connor (2007, p. 1) states that females and males are still prone to gender colour preferences because society and the media have heavily promoted the idea that pink is a girl colour and blue is a boy colour. Supporting this view, Hulbert & Ling (2007, p. 624) suggest that the sex

difference colour preferences arose from the sex-specific job specialisations formed in the evolutionary division of labour. Female brains adapted to specialise in food gathering related tasks and can be supported with Hulbert & Ling's (2007. p. 625) studies of visual spatial abilities.

This research project suggests that school aged children choose colours according to what society deems appropriate for males and females. Interestingly this research study found that thirty-seven per cent of males selected the colour pink to be their least favourite colour. This was because the boys commented that the colour pink was 'too girly' and a colour that 'boys don't like'. By comparison the females selected the colours black, brown and grey to be their least favourite colour and described them as 'dull and boring', 'yucky' and 'doesn't look pretty'.

During the pilot study a reflective journal was kept. It could be seen during this time that the students colour preferences positively affected the class's attitudes towards learning and learning materials. The students would try harder when completing work on coloured paper and they said this was because 'colour excites me and makes me try harder'.

Duggan (2009, p. 67) suggests the theory that individuals perceive colour differently, as this is the case, it is believed that optimal colour is individualistic. Duggan (2009, p. 67) proposes that more time and money need to be spent on determining individuals' colour preference. Once this preference is found students' individual assessment scores may be positively enhanced. It can be seen in this small research study that students' colour preferences vary, although the colours chosen

are limited, they do vary according to each individual. From studying the results found in this research study it is apparent that Duggan's suggestion on finding one's colour preference may positively affect students' grades.

From this research it can also be seen that choosing colour according to colour preference and enjoyment of colour has the potential to extend students' enjoyment of learning.

Influence of colour on students' emotions

This research study has shown that colour can have a significant impact on students' emotions, which will in turn lead to an influence on individuals' work and study. Meghani (2009, p. 29) discusses the direct link between the use of colour and positive and negative feelings. This discussion looks at how over the decades interior designers have manipulated colour to change individual's mood positively and negatively.

Each student interviewed in this research study indicated that colour had the ability to make him or her happy. When looking at colour having the potential to make students sad, only sixty-one per cent believe this idea is possible. Seventy-eight per cent of the participants' outlined that yes in fact colour can change your mood. One student stated "my green wall in my bedroom makes me creative", this supports Pytel's (2006, p. 1) research, which outlines that the colour green directly triggers creativity. Interestingly all participants interviewed outlined that colour did make them happy. This is remarkable, as only seventy-eight per cent of participants believe that

colour has the ability to affect a change in mood while one hundred per cent believe colour makes them happy. Contrasting this, only thirty-three per cent of students believe that colour can make them sad. This is because the age of the participants allows them to view colour simply as a positive “all colour makes me happy”.

Holiday, et al., (2009, p. 256) research has shown that different colours have the ability to represent a variety of emotions. The study found that bright colours evoke a sense of positivity and dark colours evoke negativity. The informal interviews that students participated in this research study also indicated that bright colours have the potential to affect mood and emotions positively. It was also found that the dark colours have the potential to negatively impact one’s mood and emotions.

Influence of colour on students’ behaviour

Imhof’s (2004, p. 146) study found that colour may help in the area of attention regulation and help extend motor timing. These results indicate that colour has the potential to positively or negatively affect behaviour. Similarly, this research study has found that seventy-two per cent of participants interviewed indicated that they believed colour has the ability to change one’s behaviour. A minority, eleven per cent of participants, believed that colour has the ability to only sometimes change behaviour. The participants who believe colour has the potential to change behaviour suggested that the colours you like can positively affect behaviour and the colours you do not like can negatively impact your behaviour. The participants felt that the colours you like will make you want to change your behaviour, stating that “if you like a colour it will make you behave better”.

The reflective journal kept during the pilot study indicates that from observing students' behaviour and colour in the classroom an apparent correlation can be seen. When students were in the learning area that was blue in colour they were calm, similarly Sasson's (2007, p. 1) research associates the colour blue with the ability to calm individuals.

During the pilot study an experiment was undertaken and recorded in the reflective journal. One half of the class was given white paper to work with while the other half of the class was given coloured paper. The difference could clearly be seen in how the students behaved according to the use of white paper or coloured paper. The students worked harder and were able to concentrate on the task for an extended period of time when using coloured paper worksheets. Elliot (2007, p. 8) suggests that colour is often not viewed as has having the ability to change behaviour, but it does carry meaning, "Colour is a signal, and those signals can affect our behaviour automatically without us even being aware of it" (Elliot, 2007, p. 8).

This research study shows that students' perceptions of colour allow behaviour to be changed within the classroom by the selective use of colour.

Conclusion

This study has demonstrated that colour preference for boys and girls is strongly gender determined. Further, that colour used by teachers in the classroom

environment as well as written learning materials greatly influences students' attitudes towards learning, emotions and behaviour.

CHAPTER 6 – CONCLUSION AND RECOMMENDATIONS

This project was an exploratory study into young children's perceptions of colour. The literature revealed that colour has the ability to impact mood, behaviour, interest and attitudes to learning and learning materials; depending on individuals colour preferences, according to gender and age.

Although this study does not aim to generalise the findings across all school populations, the findings can be applied to the schools involved in the study and may be of interest to educators in similar schools. The aim of this study was to determine if colour preference affects students' interest and attitudes to learning and learning materials, the effect colour has on students' behaviour, colour preferences influence on students' emotions and the gender differences in colour preference. Through identifying colour preferences, the study provides a better understanding of the impact of colour on students.

The research has identified that in the group of students, who took part in the study, the main underlying colour factor that influenced behaviour, mood and learning in the classroom was colour preference. This was evident in the students' comments regarding how they felt about colour preferences. Four main components that were identified through the research, that colour preference influences, were (a) the positive effect on students' interest and attitudes to learning and learning materials; (b) the clear effect colour has on behaviour; (c) the noticeable effect colour has on emotions and (d) the gender differences in colour preferences. Colour preference was a recurring emergent theme that was identifiable in all students' comments.

From the data gathered it can be concluded that the more you like a colour the greater the positive effect on behaviour, mood and attitudes towards learning will occur within the classroom. It can also be concluded that colour preference is generally determined according to gender. This means that colours used in a classroom need to be carefully selected to cater for the needs of both genders represented.

Recommendations

From this study, recommendations can be made in order to assist the effective use of colour in the classroom. The major recommendation from this study is the need to find out the colour preferences of students within the classroom; once this has been determined a teacher can choose colours that will positively influence his/her particular classroom. Asking students what colours they prefer and then incorporating these preferences into the classroom environment, lessons and learning materials can achieve this. By choosing colours according to preference, students' behaviour, mood and learning will have the opportunity to be modified positively and enhanced.

In addition to the specific recommendation noted above, general recommendations can be made regarding colour in the classroom. The first point is that students select colour strongly influenced by gender. Therefore it is important to use a colour in the classroom that is considered gender neutral, for example yellow. The second point is that colour has the potential to impact behavioural changes. To ensure a positive impact is made it is important to select coloured learning materials that students like

and are drawn towards, e.g. boys prefer blue and girls prefer pink. The last point is that colour has the ability to both positively and negatively impact one's mood according to colour preference. This means that teachers once again need to use colours in the classroom that cater for the preferences of the students. The colours that are seen to positively affect mood are considered to be bright and 'happy' colours.

Implications for further research

As this is an honours research paper it is limited; however this research can be continued and investigated further. The research needs to be enlarged and an invitation given for a wider range of students to participate in the research. This would give a broader perspective on students' colour preferences and provide more realistic perceptions on the influence of colour preference within a classroom. Students from all year levels could be invited to participate in this further research. Data could then be compared between the stage levels and ages of the students.

It would also be of interest to extend the research to include young children born in specific overseas locations and recently arrived in Australia, to see if there are any apparent differences in their colour preferences.

APPENDIX A

Format of semi-structured interviews

1) What is your favourite book? Does the colour of the book help you decide?
2) Do you notice colour? When do you notice colour?
3) Can you choose and point to the colour you like the most? Why?
4) Can you choose and point to a colour that you like the least? Why?
5) Does colour make you happy? Which ones?
6) Does colour make you feel sad? Which ones?
7) Do you think colour changes how you behave? Why?
8) Do you think different colours change your mood? Why?
9) If you could choose any colour to paint the classroom walls, what colour would you choose? Why?

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